

REMARKS

The Applicant thanks the Examiner for the thorough consideration given the present application. Claims 1 and 9 are currently being prosecuted. Claims 1 and 9 are amended. Claim 1 is independent. The Examiner is respectfully requested to reconsider the rejections in view of the Amendments and Remarks as set forth hereinbelow.

Rejection Under 35 USC 103(a)

Claims 1 and 4-9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Roth et al. (U.S. 4,965,864) in view of Wright (U.S. 4,864,849), Ohki et al. (U.S. 5,302,872), and Welterlin (U.S. 4,578,606). This rejection is respectfully traversed.

Amendments to Independent Claim 1

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the present application, independent claim 1 has been amended herein to recite a combination of elements directed to an electromagnetic pump, including *inter alia*

“air-core electromagnetic coils (50a, 50b), in which electric current flows in opposite directions, being fitted around said cylinder, ...

an air-core detecting coil (53) for detecting reciprocating motion of said moving member (10), said air-core detecting coil (53) being fitted around said cylinder so as to be coaxial with said air-core electromagnetic coils (50a, 50b); ...

a position of said moving member (10) is detected by detecting an increase of the magnetic flux interlinking with said air-core detecting coil (53), the increase of magnetic flux

is caused by a magnetic circuit which passes through said yoke (26a), and said outer yoke (52), and said yoke (26b), and through which the magnetic flux generated, from said moving member (10), by the reciprocating motion of said moving member (10) passes.”

Features of Claims 1 and 9 of the Present Application

The amendment of independent claim 1 is based on US2006/0239842A, which is the Published Application of the present application. Independent claim 1 clarifies the current directions of the electromagnetic coils (50a, 50b) and the functions thereof (please see the paragraph [0039] of the Published Application). Further, amended claim 1 clarifies: that the position of the moving member (10) is detected, by detecting the increase of the magnetic flux interlinking with the air-core detecting coil (53), with reducing influences of energization of the electromagnetic coils (50a, 50b); and that the increase of the magnetic flux is caused by the magnetic circuit which passes through the yoke (26a), the outer yoke (52) and the yoke (26b) and through which the magnetic flux generated, from the moving member (10), by the reciprocating motion of the moving member (10) passes (please see the paragraph [0048] of the Published Application).

The amendment of dependent claim 9 is based on the paragraph [0052] and Fig. 9 of US2006/0239842A. Namely, the variation of the electric current flows through the air-core electromagnetic coils (50a, 50b) is small in the detection range.

Regarding the Cited References

According to the Examiner, prior to the filing of the present patent application, it would have been obvious for a person ordinarily skilled in the art of the present invention for air-core coils of Ohki et al. (US Pat. No. 5,302,872) to be applied to a pump of Roth et al. (US Pat. No. 4,965,864), and for a detection method of Wright (US Pat. No. 4,864,849) to be applied to the pump of Roth et al. to use the air-core coils as a position sensor.

The Applicant respectfully disagrees.

Roth et al. disclose a linear motor, in which a piston is provided in a cylinder and reciprocally moved therein by energizing the coils, which are provided on an outer circumferential face of the cylinder at regular intervals. A control circuit may include a sensor for detecting a position of the piston. However, Roth et al. do not disclose or suggest using an air-core coil as the sensor. In Roth et al., no air-core detecting coil is required due to the reciprocating motion of the piston, further a yoke for improving detection sensitivity of the detecting coil, which detects induced voltage, is not required.

The air-core coils of Ohki et al. are used to apply effective attraction forces to a movable magnetic member. Ohki et al. do not disclose or suggest a detecting coil for detecting a position of the movable magnetic member.

Further, in the detection method of Wright, mutual inductance variation between driving coils is detected, so a detecting coil provided between the driving coils is not required. Therefore, applying the method of Wright to the pump of Roth et al., as the position detecting sensor, is not obvious. It is respectfully submitted that the Examiner's position is not sanctioned by the provisions of 35 U.S.C. § 103.

Therefore, the air-core detection coil provided, with the yoke, between the air-core electromagnetic coils, which move the moving member, is not disclosed or suggested in the combination of the cited references. Thus, the Applicant believes that the Examiner's position (i.e., applying the method of Wright to the position detecting sensor required by Roth et al. is obvious) includes a leap of logic. Further, the Examiner's position (i.e., using air-core coils in the pump of Roth et al. is obvious) is a hindsight reconstruction of the prior art which is not sanctioned by 35 U.S.C. § 103.

A feature of the present application (i.e., the position of the moving member (10) is detected by detecting an increase of the magnetic flux interlinking with the air-core detecting coil (53), the increase of the magnetic flux is caused by a magnetic circuit which passes through the yoke (26a), the outer yoke (52) and the yoke (26b) and through which the magnetic flux generated, from the moving member 10, by the reciprocating motion of the moving member (10) passes.) is not disclosed or suggested in Roth et al. (US Pat. No. 4,965,864), Ohki et al. (US Pat. No. 5,302,872) and Wright (US Pat. No. 4,864,849). Namely, the feature of the present application (i.e., detecting the position of

the moving member (10) by the detecting coil (53)) is unique to the presently claimed invention.

At least for the reasons explained above, the Applicant respectfully submits that the combination of elements as set forth in independent claim 1 is not disclosed or made obvious by the prior art of record, including Roth et al. (U.S. 4,965,864) in view of Wright (U.S. 4,864,849), Ohki et al. (U.S. 5,302,872), and Welterlin.

Therefore, independent claim 1 is in condition for allowance.

Dependent Claims

The Examiner will note that dependent claim 9 has been amended, and dependent claims 4-8 have been cancelled.

Dependent claim 9 is in condition for allowance due to their dependency from allowable independent claims, or due to the additional novel features set forth therein.

All pending claims are now in condition for allowance.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §103(a) are respectfully requested.

CONCLUSION

In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on by the Examiner, either alone or in combination.

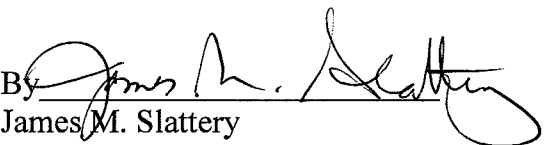
All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, he is invited to telephone Carl T. Thomsen (Reg. No. 50,786) at (703) 208-4030 (direct line).

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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